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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/417,832	10/14/1999	TOMONARI HORIKIRI	35.C13929	8008

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EXAMINER

RUTHKOSKY, MARK

ART UNIT PAPER NUMBER

1745

DATE MAILED: 05/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/417,832

Applicant(s)

HORIKIRI ET AL.

Examiner

Mark Ruthkosky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,6,7,9 and 10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,6,7,9 and 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Summary

Claims 1, 6-7 and 9-10 are pending.

Specification

The objection to the amendment of the specification filed 3/19/2003 under 35 U.S.C. 132 because it introduces new matter into the disclosure has been overcome by the applicant's amendment canceling the new matter.

Claim Rejections - 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 10 is rejected under 35 U.S.C. 103(a) as being obvious over Williams et al. (US 5,470,677) in view of Green et al. (WO 98/11619.)

Williams et al. (US 5,470,667) teaches a cell comprising a gel electrolyte for a battery that includes an organic solvent, an electrolyte salt and a gelling agent such as sorbitols including DBS (which are polyhydroxy compounds, see col. 1, line 65- col. 2,

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line 49.) The gelling agent inherently gels by forming a fibrous associated body by intermolecular bonding. Battery components are included throughout the reference. Williams et al. (US 5,470,667) does not teach a gel electrolyte that includes an ionically conductive material that is liquid at working temperature. The electrolyte of Williams is a salt dissolved in an organic solution.

Green et al. (WO 98/11619) teaches an electrolyte, which comprises a composite of a polymer and a molten salt, immobilized within the polymer. The molten salts may be pyridinium or imidazolium salts (see page 2, lines 1-10.) Polymers include polyethylene oxide, polyacrylonitrile and PVDF amongst others (see page 2, lines 10-21.) These polymers are gelling agents that are capable of forming a polymer-associated body by coordination bonding or hydrogen bonding. Functional groups, such as carbonyls, are noted in these materials. These materials are also noted in the instant specification for the same use as the instant invention (page 2). The electrolyte is used in electrochemical cells and electrochromic windows (see abstract, page 3.)

It would be obvious to one of ordinary skill in the art at the time the invention was made to include a liquid salt as an ionically conductive material in Williams as the materials will provide improved ionic conductivity and improved operation at high temperatures as taught by Green. Green et al. (WO 98/11619) shows molten salts such as pyridinium or imidazolium in polymer gel electrolytes that are provided to transfer charge. One of ordinary skill in the art may substitute these liquid salts in Williams to provide improved ionic conductivity and operation at high temperatures.

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The rejection of claims 1, 6, 7, 9 and 10 under 35 U.S.C. 103(a) as being unpatentable over Anson et al. (US 5,008,339) in view of Green et al. (WO 98/11619) is withdrawn.

Claims 1, 6, 7, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (US 5,470,677) in view of Terech et al. (Chem. Rev. 1997, 97, 3133-3159) and further in view of Green et al. (WO 98/11619.)

Williams et al. (US 5,470,667) teaches a cell comprising a gel electrolyte for a battery that includes an organic solvent, an electrolyte salt and a gelling agent such as sorbitols including DBS (which are polyhydroxy compounds, see col. 1, line 65- col. 2, line 49.) The gelling agent inherently gels by forming a fibrous associated body by intermolecular bonding. Battery components are included throughout the reference. Williams et al. (US 5,470,667) does not teach a gel electrolyte that includes an ionically conductive material that is liquid at working temperature. In Williams, the electrolyte is a salt dissolved in an organic solution.

Terech et al. (Chem. Rev. 1997, 97, 3133-3159) teaches an overview of organo-gel materials including DBS. DBS is taught to be useful as gel electrolyte solutions for lithium battery applications in the instant specification, Terech (p. 3157) and Williams. It would be obvious to one of ordinary skill in the art at the time the invention was made to substitute the various organo-gel materials taught by Terech et al. (Chem. Rev. 1997, 97, 3133-3159) for the DBS material in Williams as one of ordinary skill in the art would understand that the materials will provide a gel electrolyte for incorporating electrolyte salts to be useful for transferring ions in gel electrolyte solutions. The references do not

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teach an ionically conducting material that is a salt that is liquid at working temperatures as an electrolyte in the batteries.

Green et al. (WO 98/11619) teaches an electrolyte that comprises a composite of a polymer and a molten salt immobilized within the polymer gel. The molten salts may be pyridinium or imidazolium salts (see page 2, lines 1-10.) Polymers include polyethylene oxide, polyacrylonitrile and PVDF amongst others (see page 2, lines 10-21.) These polymers are gelling agents that are capable of forming a polymer-associated body by coordination bonding or hydrogen bonding. These materials are also noted in the instant specification for the same use as the instant invention (page 2). The electrolyte is used in electrochemical cells and electrochromic windows (see abstract, page 3.)

It would be obvious to one of ordinary skill in the art at the time the invention was made to include a liquid salt as an ionically conductive material in Williams as the materials will provide improved ionic conductivity and improved operation at high temperatures as taught by Green. Green et al. (WO 98/11619) shows molten salts such as pyridinium or imidazolium in polymer gel electrolytes, which are provided to transfer charge. One of ordinary skill in the art may substitute these liquid salts in Williams to provide improved ionic conductivity and operation at high temperatures.

Response to Arguments

Applicant's arguments filed 9/2/2003 have been fully considered are not persuasive. The Williams prior art teaches gelled electrolytes of lithium salts, but does not include molten lithium salts in the gel. Further, the Green prior art teaches molten lithium salts in polymer electrolytes similar to the gel electrolytes, however, the reference

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does not state that the electrolyte is a gel. It is simply referred to as a solid with the molten electrolyte as part of the polymer electrolyte. In addition, the Terech prior art teaches a variety of gels and gelling agents, including the gelling agent taught in Williams, and states that gels may be used in battery electrolyte applications.

Rejection under 35 U.S.C. 103(a) as being obvious over Williams et al. (US 5,470,677) in view of Green et al. (WO 98/11619): The applicant's argues that it would not be obvious to use a liquid electrolyte salt in the gel electrolyte of Williams. Williams teaches a variety of electrolyte gels and salts. The reference states that "any substance which is soluble and ionized in the organic solvent may serve as the electrolyte," and that "any solvent may be used in the formation of the gel of the invention," (col. 2.) Acetonitrile is used as a solvent in both the Williams reference (col. 2, lines 50-end) and the Green reference (see example 1.) From this, it is clear that the molten salts of Green would serve as the electrolyte salts in the invention of Williams as the molten salt will dissolve in the solvent of Williams and that the mixture will form a gel in the same manner as taught by Williams in column 2.

Rejection under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (US 5,470,677) in view of Terech et al. (Chem. Rev. 1997, 97, 3133-3159) and further in view of Green et al. (WO 98/11619):

The applicant's argues that it would not be obvious to use a liquid electrolyte salt in the gel electrolyte of Williams. The applicant relies on teachings of Terech which states that "it is not possible to reasonably predict whether a particular molecule will gel a selected liquid." (See page 3137, section III.) First, it is noted that at least one gelling

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agent of Terech is shown to gel the electrolyte solvents of Williams including acetonitrile (see page 3146.) In addition, Williams teaches a variety of electrolyte gels and salts with ammonium salts being preferred. The molten salts of Green are ammonium salts. The reference states that “any substance which is soluble and ionized in the organic solvent may serve as the electrolyte,” and that “any solvent may be used in the formation of the gel of the invention,” (col. 2.) Acetonitrile is used as a solvent in both the Williams reference (col. 2, lines 50-end) and the Green reference (see example 1.) From this, it is clear that the molten salts of Green would serve as the electrolyte salts in the invention of Williams as the molten salt will dissolve in the solvent of Williams and that the mixture will form a gel in the same manner as taught by Williams in column 2.

It is noted in Terech that organogels, as shown in the reference, result from interactions between the gelling agent and organic liquids including dipolar interactions, hydrogen bonds and metal coordination bonds (page 3134, col. 1, second and third paragraphs and col. 2, second paragraph.) The pyridinium and imidazolium molten electrolyte salts of the Green reference meet this criteria based on the charges within the molecule and the salt, and offer a reasonable expectation of success with the gelling agents. One of ordinary skill in the art would be motivated to use the gelling agents taught by Terech with the electrolyte solvents, including molten salts, taught in the William and Green references when the references are considered as a whole in order to form a gelled electrolyte. The Terech reference teaches that the gels have numerous industrial applications such a membranes, the transmission of electrical power and gelling electrolyte solutions in battery applications. The Williams and Green reference teach the use of lithium salts, including molten salts, in gel polymer electrolyte systems. It is also

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noted that the methods of making the gels in Williams (col. 2, lines 20-50) are equivalent to those taught in Terech ((page 3133.) Based on the art as a whole, it would be obvious to one of ordinary skill in the art to use the gelling agents of Terech with a molten electrolyte salt for form an electrolyte for battery and electrochromic applications.

Conclusion

This is a RCE of the instant application. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action in this case. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no, however, event will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

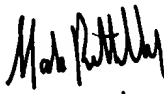
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Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745


5/20/04